



PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of)
)
Tara L. Cobble et al) Art Unit: 2857
)
Application No.: 09/742,879) Examiner: Elias Desta
)
Filed: December 20, 2000) Paper No.: 15
)
For: METHOD AND SYSTEM FOR)
PROVIDING DIAGNOSTICS FOR A)
WORK MACHINE)
)
Attorney Docket No.: 00-104)
_____)

Peoria, Illinois 61629-6490
August 23, 2004

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

APPELLANTS' BRIEF IN SUPPORT OF APPEAL FROM THE PRIMARY
EXAMINER TO THE BOARD OF PATENT APPEALS AND INTERFERENCES

Sir:

This Brief in support of Appellant's Notice of Appeal is being submitted in triplicate pursuant to 37 C.F.R. 1.192. Please charge deposit account No. 03-1129 the filing fee of \$330.00 as specified in 37 C.F.R. 1.17(c) and any other charges required for the filing of this brief. Claims 1-22, and 25 - 45 are attached hereto in Appendix A, pursuant to 37 C.F.R. 1.192(c)(9).

Real Party in Interest

Caterpillar Inc. is the assignee of the present application and, therefore, is the real party in interest in the present appeal.

08/31/2004 EAREGAY1 00000014 031129 09742879

01 FC:1402 330.00 DA

Related Appeals and Interferences

There are no other pending appeals or interferences related to the application that is the subject of this appeal. Further, Appellant has no knowledge of any appeals or interferences which would have an effect on the present appeal.

Status of Claims

Claims 1 – 8, 11 – 20, 22, 25 – 31, 34 – 43 and 45 are pending in the application that is the subject of this appeal. The Examiner finally rejected claims 1 – 8, 11 – 20, 22, 25 – 31, 34 – 43 and 45 in the Office Action dated December 23, 2003. Appellant is appealing the rejection of claims 1 – 8, 11 – 16, 22, 25 – 31, 33 – 39 and 45.

Status of Amendments

Appellant filed an amendment subsequent to the final rejection dated December 23, 2003. The Examiner indicated in an Advisory Action dated May 4, 2004, that the amendment would not be entered.

Summary of Invention

The present invention relates to a computer based method and system for providing case based diagnostics for a work machine. Generally, a case contains diagnostic information and processes related to a work machine. For example, a case may contain a list of symptoms, a set of case bases, and a set of action items describing an appropriate repair or test. A case base contains questions and paths to possible repairs/test. The case base includes answers to the questions that are designed to lead the user to a diagnosis or an action item to solve the problem. The claimed invention also has the ability to dynamically read data values from the work machine during the diagnosis. In addition, the system may provide links to other systems having information desired to perform the diagnosis.

The present invention relates to receiving a description of an initial problem related to the work machine from a user (e.g., the engine overheats). At least one question is displayed to the user, as a function of the initial problem (e.g., which type of value is out of specification, are there any diagnostic codes etc.). A list of possible actions to resolve the

complaint are displayed to the user as a function of the initial problem (e.g., high temperature; transmission oil, too much oil in the transmission, or high temperature; rear axle, transfer brake is leaking etc.). The possible actions may also include confidence levels associated with the systems determination regarding the likelihood that particular action is the solution. The user then answers one or more of the questions presented. As the question(s) are answered, the possible actions, and confidence levels if used, are updated, i.e., a second set of recommended actions is displayed. In addition, in one embodiment, the system identifies inconsistent answers provided by the user to the questions.

A question to be answered may indicate that there is additional information that is desired from the machine. For example, if the current hydraulic oil temperature is necessary to answer the question, then the user may select, or automatically be provided with a display enabling the user to request the system dynamically determine the hydraulic oil temperature. That is, the system may dynamically read data values from the machine. This feature helps ensure the proper measurements are obtained (since the system is performing the measurements), and reduces the time period to diagnose the problem by reducing the time the user has to spend acquiring additional information. In one embodiment, based on a users request (e.g., a specific request for machine information, of an indication to acquire the information dynamically, as needed by the system, the system dynamically determines the value of a machine parameter (e.g., engine oil).

Issues

1. Whether the Examiner erred in rejecting claims 1 and 45 as being unpatenable over Molloy (U.S. Patent 5,787,234, hereafter referred to as “Molloy”) in view of Phung et al. (U.S. PAP 2002/0007237, hereafter referred to as “Phung”). The Examiner’s arguments associated with the rejection of claims 1, and 45 was also used, in part, as the basis for rejection of claim 22.

2. Whether the Examiner erred in rejecting claims 22 as being unpatenable over Molloy (U.S. Patent 5,787,234, hereafter referred to as “Molloy”) in view of Phung et al. (U.S. PAP 2002/0007237, hereafter referred to as “Phung”), and further in view of Nguyen et al. (U.S. Patent 6,125,312, hereafter referred to as “Nguyen”).

Grouping of Claims

With respect to each of the rejections, Appellants group the claims as follows:
Claims 1 – 8, 11 – 16, 22, 25 – 31, 33 – 39 and 45 stand together

Argument

I. The Examiner erred in rejecting claims 1 and 45 as being unpatentable over Molloy in view of Phung.

Neither Molloy or Phung alone or combined teach or suggest “displaying two or more questions as a function of the initial problem” and “identifying inconsistent answers provided by the user to the two or more questions”; as recited in Claim 1, 22, and 45.

The Examiner has stated that Molloy discloses “identifying inconsistent answers provided by the user to the two or more questions”, as recited in Claim 1, 22, and 45 of the present invention. The Examiner references the following passage from Molloy:

Either way, the user first retrieves ostensibly useful past cases and then applies some logical reasoning technique to derive valuable inferences from this finite set. Key assumptions in the case-based reasoning approach are that users will describe analogous situations in consistent ways, adhering to a reasonably uniform nomenclature, and that the implementation is such that the system will continue to search rapidly enough to be practical as the case base grows in size. [Col. 2 Lines 7 – 15]

The Examiner indicates that the above passage discloses modifying “the consistent approach of “case based” method and adapt the system for purposes of identify[ing] inconsistency based on the users answer to multiple questions” [Official Action 12/23/2003, Page 4, first full paragraph, and Page 10 – 11, (starting with last two sentences of Page 10). However, this passage makes no such reference to identifying inconsistencies to users answers. If anything, this passage suggest that the system relies on the assumption that “users will describe analogous situations in consistent ways, . . .” This indicates the system is reliant on the users entering the information in a consistent way, as opposed to saying the system has the capability to identify inconsistencies. This passage does not teach or suggest

“identifying inconsistent answers provided by the user to the two or more questions”, as recited in Claim 1, 22, and 45.

The Examiner also references the following passage from Molloy:

The adaptive learning system is initialized by loading into the system cases which typically were derived from previous experience. For example, if the system application is as a help desk that is used in maintaining a computer network, each of the cases that is initially input into the system might identify a user, the equipment he is using, a problem previously encountered with the equipment, a diagnosis of the cause of the problem and a recommended action that was taken to solve the problem. The cases are stored by the processor in the case table in long-term memory. Each of the concepts identified in the cases is stored in the concept table in the long-term memory. As is detailed below, the case and concept tables are stored in compact form so as to minimize storage requirements and expedite searching of these tables.

From these cases the processor can then generate in real time ordered lists of concepts which are most closely associated with free text or with one or more concepts that are provided as inputs to the system. For example, if the system is queried about a specific problem experienced by a specific user with specific equipment, it can generate a list of possible diagnoses and corrective actions of this problem with the diagnoses and corrective actions ordered in the sequence of most likely diagnosis or correction on the basis of a past experience. Moreover, the system accumulates the information received about each new problem, which constitutes a new case, by constantly updating its case table in the long-term memory. As a result, each time the lists in short-term memory are regenerated, they too have been updated so that the order of diagnoses and corrective actions on the list will change with accumulated experience.

The system provides a type of processing that is conceptually close to that of a neural network, but overcomes the drawbacks of conventional neural nets, i.e., their need for continual retraining and their inability to scale up to large size, which arise because the neural net program and data are too large to reside in RAM. The system is more compact in part because the system does not require permanent storage of values for connection weights between concepts, as does a neural network. Rather, the system of the present invention simply stores the raw data in the form of concepts and cases in the long-term memory and computes in real time the scores needed to order the concepts for presentation to the user in the form of appropriate lists. [Col. 4, Lines 15 – 57]

The above passage does not teach or suggests “identifying inconsistent answers provided by the user to the two or more questions”, as recited in Claim 1. Accordingly, Claim 1, is believed to be allowable. By analogy, Claims 22 and 45 are believed to be allowable. In addition, the claims depending from Claims 1, 22, and 45 are also believed to be allowable since they depend from an allowable claim.

Therefore, neither Molloy or Phung alone or combined, teach or suggest: “identifying inconsistent answers provided by the user to the two or more questions” as recited in Claim 1, 22, and 45.

In light of the foregoing arguments, Appellant respectfully submits that the Examiner’s rejection of claims 1, 22, and 45 as being unpatentable over Molloy in view of Nguyen et al. was improper. In light of this, Claims 1, 22, and 45 are believed to be allowable, and additionally, the amended claims associated dependent claims 2 - 8, 11 – 16, 25 – 31, and 33 – 39 are believed to be allowable.

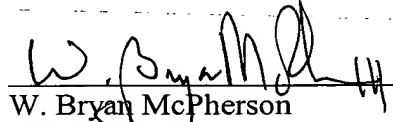
II. The Examiner erred in rejecting claims 22 as being unpatentable over Molloy in view of Phung, and further in view of Nguyen.

Neither Molloy, Phung, or Nguyen alone or combined teach or suggest “displaying two or more questions as a function of the initial problem” and “identifying inconsistent answers provided by the user to the two or more questions”; as recited in Claim 22. The Examiner indicates that Molloy discloses “identifying inconsistent answers provided by the user to the two or more questions”, as discussed above. Nguyen is utilized by the Examiner for the proposition that Nguyen discloses “providing a link to information in response to actuation of the link”. [Official Action of 12/23/2003, Page 7, first two paragraphs]. Therefore, Nguyen does not teach or suggest “identifying inconsistent answers provided by the user to the two or more questions”; as recited in Claim 22. Accordingly, for the reasons given above with respect to the rejection of Claim 1 and Claim 45 (Section 1 above), Claim 22 and the associated dependent claims 25 – 31, and 33 – 39 are believed to be allowable.

Conclusion

Applicants respectfully request the Board to reverse the Examiner's final rejection of the claims pending in the present application and to order the allowance of those claims.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "W. Bryan McPherson", is written over a horizontal line.

W. Bryan McPherson
Patent Attorney
Attorney Reg. No. 41,988
Caterpillar Inc.

Telephone: (309) 675-4015
Facsimile: (309) 675-1236

Appendix A
Claims Involved in the Appeal

Claims

Claim 1. (previously presented) A computer based method for providing case base diagnostics for a work machine, the case bases being comprised of diagnostic information and processes related to the work machine, including the steps of:

receiving from a user, a description of an initial problem related to the work machine;

displaying two or more questions as a function of the initial problem;

identifying inconsistent answers provided by the user to the two or more questions;

displaying a first set of recommended actions, as a function of the initial problem;

reading data values from the work machine in response to a user request;

receiving an answer from the user to the at least one question; and,

displaying a second set of recommended actions as a function of the initial problem and the answer to the two or more questions, wherein the second set of recommended actions is one of a subset of the first set of recommended actions, a set of other recommended actions, and a combination of recommended actions from the first set and an another set.

Claim 2. (original) A computer based method, as set forth in claim 1, including the step of displaying the answer provided by the user.

Claim 3. (original) A computer based method, as set forth in claim 1, including the step of displaying a confidence level associated with each recommended action in the first and second sets of recommended actions.

Claim 4. (original) A computer based method, as set forth in claim 3, including the wherein the confidence level is displayed as a bar graph.

Claim 5. (original) A computer based method, as set forth in claim 1, including the step of displaying a status associated with each recommended action in the first and second sets of recommended actions.

Claim 6. (original) A computer based method, as set forth in claim 5, wherein the status associated with each recommended action has a value one of performed or not performed.

Claim 7. (original) A computer based method, as set forth in claim 1, including the step of providing a link to information related to the work machine in an external source.

Claim 8. (original) A computer based method, as set forth in claim 7, including the step of displaying the information in response to actuation of the link.

Claim 9. (previously withdrawn) A computer based method, as set forth in claim 1, wherein the step of displaying at one question includes the step of displaying two or more questions and wherein the computer based method includes the step of identifying inconsistent answers provided by the user to the two or more questions.

Claim 10. (previously withdrawn) A computer based method, as set forth in claim 1, including the step of reading data values from the work machine in response to a user request.

Claim 11. (original) A computer based method, as set forth in claim 1, including the step of displaying an alert link corresponding to the at least one question.

Claim 12. (original) A computer based method, as set forth in claim 11, including the step of displaying an alert dialog in response to actuation by the user of the alert link.

Claim 13. (original) A computer based method, as set forth in claim 1, including the step of displaying an alert link corresponding to at least one recommended action from one of the first and second sets of recommended actions.

Claim 14. (original) A computer based method, as set forth in claim 13, including the step of displaying an alert dialog in response to actuation by the user of the alert link.

Claim 15. (original) A computer based method, as set forth in claim 1, including the step of displaying a question detail window containing detailed information regarding the at least one question, in response to user selection of the at least one question.

Claim 16. (original) A computer based method, as set forth in claim 1, including the step of displaying an action detail window containing detailed information regarding a selected action from one of the first and second sets of recommended actions.

Claim 17. (previously presented) A computer based method for providing case base diagnostics for a work machine, the case bases being comprised of diagnostic information and processes related to the work machine, including the steps of:

receiving from a user, a description of an initial problem related to the work machine;

displaying at least one question, as a function of the initial problem;

displaying a first set of recommended actions, as a function of the initial problem;

receiving an answer from the user to the at least one question;

reading data values from the work machine in response to a user request;

displaying a second set of recommended actions as a function of the initial problem, the read data values, and the answer to the at least one question, wherein the second set of recommended actions is one of a subset of the first set of recommended actions, a set of

other recommended actions, and a combination of recommended actions from the first set and an other set; and,

displaying an action detail window containing detailed information regarding a selected action from one of the first and second sets of recommended actions; and
providing a graphical user interface for operation by the user.

Claim 18. (original) A computer based method, as set forth in claim 17, including the step of providing a diagnostic advisor window.

Claim 19. (original) A computer based method, as set forth in claim 18, including the step of providing a tabbed window pane having a plurality of tabs, wherein selection of one of the tabs results in a respective one of a plurality of panels being displayed in the tabbed panel.

Claim 20. (original) A computer based method, as set forth in claim 19, wherein each of the plurality of tabs corresponds to a diagnostic panel, a diagnostic code panel, and a functional tests panel, respectively.

Claim 21. (previously withdrawn) A computer based method, for providing case base diagnostics for a work machine, the case bases being comprised of diagnostic information and processes related to the work machine, including the steps of:

receiving from an user, a description of an initial problem related to the work machine;

displaying at least one question, as a function of the initial problem;

displaying a first set of recommended actions, as a function of the initial problem;

reading data values from the work machine in response to a user request;

receiving an answer from the user to the at least one question;

displaying the answer provided by the user;

displaying a second set of recommended actions as a function of the initial

problem and the answer to the at least one question, wherein the second set of recommended actions is one of a subset of the first set of recommended actions, a set of other recommended actions, and a combination of recommended actions from the first set and an other set;

displaying a confidence level associated with each recommended action in the first and second sets of recommended actions; and,

providing a link to information related to the work machine in an external source.

Claim 22. (previously presented) A computer based system for providing case base diagnostics for a work machine, the case bases being comprised of diagnostic information and processes related to the work machine, comprising:

an external source containing service information related to the work machine;
a diagnostic advisor tool for interaction with a user, receiving information from the user and responsively displaying at least one recommended action, and providing a link to relevant information within the external source; and

wherein the diagnostic advisor tool is adapted to receive, from the user, a description of an initial problem related to the work machine, display two or more questions as a function of the initial problem, identify inconsistent answers provided by the user to the two or more questions, display a first set of recommended actions, as a function of the initial problem, read data values from the work machine in response to a user request; receive an answer from the user to the at least one question and display a second set of recommended actions as a function of the initial problem and the answer to the at least one question, wherein the second set of recommended actions is one of a subset of the first set of recommended actions, a set of other recommended actions, and a combination of recommended actions from the first set and an other set.

Claim 23. (previously withdrawn) A computer based system, as set forth in claim 22, wherein the diagnostic advisor tool is adapted to receive, from the user, a description of an initial problem related to the work machine, display at least one question, as

a function of the initial problem, and display a first set of recommended actions, as a function of the initial problem.

Claim 24. (previously withdrawn) A computer based system, as set forth in claim 23, wherein the diagnostic advisor tool is adapted to receive an answer from the user to the at least one question and display a second set of recommended actions as a function of the initial problem and the answer to the at least one question, wherein the second set of recommended actions is one of a subset of the first set of recommended actions, a set of other recommended actions, and a combination of recommended actions from the first set and an other set.

Claim 25. (original) A computer based system, as set forth in claim 22, wherein the diagnostic advisor tool is adapted to display the answer provided by the user.

Claim 26. (original) A computer based system, as set forth in claim 22, wherein the diagnostic advisor tool is adapted to display a confidence level associated with each recommended action in the first and second sets of recommended actions.

Claim 27. (original) A computer based system, as set forth in claim 26, wherein the confidence level is displayed as a bar graph.

Claim 28. (original) A computer based system, as set forth in claim 22, wherein the diagnostic advisor tool is adapted to display a status associated with each recommended action in the first and second sets of recommended actions.

Claim 29. (original) A computer based system, as set forth in claim 28, wherein the status associated with each recommended action has a value of one of performed or not performed.

Claim 30. (original) A computer based system, as set forth in claim 22, wherein the diagnostic advisor tool is adapted to provide a link to information related to the work machine in an external source.

Claim 31. (original) A computer based system, as set forth in claim 30, wherein the diagnostic advisor tool is adapted to display the information in response to actuation of the link.

Claim 32. (previously withdrawn) A computer based system, as set forth in claim 22, wherein the diagnostic advisor tool is adapted to display two or more questions and to identify inconsistent answers provided by the user to the two or more questions.

Claim 33. (original) A computer based system, as set forth in claim 22, wherein the diagnostic advisor tool is adapted to read data values from the work machine.

Claim 34. (original) A computer based system, as set forth in claim 22, including the step of displaying an alert link corresponding to the at least one question.

Claim 35. (original) A computer based system, as set forth in claim 34, wherein the diagnostic advisor tool is adapted to display an alert dialog in response to actuation by the user of the alert link.

Claim 36. (original) A computer based system, as set forth in claim 22, wherein the diagnostic advisor tool is adapted to display an alert link corresponding to at least one recommended action from one of the first and second sets of recommended actions.

Claim 37. (original) A computer based system, as set forth in claim 36, wherein the diagnostic advisor tool is adapted to display an alert dialog in response to actuation by the user of the alert link.

Claim 38. (original) A computer based system, as set forth in claim 22, wherein the diagnostic advisor tool is adapted to display a question detail window containing detailed information regarding the at least one question, in response to user selection of the at least one question.

Claim 39. (original) A computer based system, as set forth in claim 22, wherein the diagnostic advisor tool is adapted to display an action detail window containing detailed information regarding a selected action from one of the first and second sets of recommended actions.

Claim 40. (previously amended) A computer based system for providing case base diagnostics for a work machine, the case bases being comprised of diagnostic information and processes related to the work machine, comprising:

- an external source containing service information related to the work machine;
- a diagnostic advisor tool for interaction with a user, receiving information from the user and responsively displaying at least one recommended action, and providing a link to relevant information within the external source;

- a graphical user interface for operation by the user; and

- wherein the diagnostic advisor tool is adapted to read data values from the work machine in response to a user request and display an action detail window containing detailed information regarding at least one of said recommended actions.

Claim 41. (original) A computer based system, as set forth in claim 40, wherein the graphical user interface includes a diagnostic advisor window.

Claim 42. (original) A computer based system, as set forth in claim 40, wherein the graphical user interface includes a tabbed panel having a plurality of tabs, wherein selection of one of the tabs results in a respective one of a plurality of panels being displayed in the tabbed panel.

Claim 43. (original) A computer based system, as set forth in claim 42, wherein each of the plurality of tabs corresponds to a diagnose problem panel, a diagnostic code panel, and a functional tests panel, respective.

Claim 44. (currently withdrawn) A computer based system for providing case base diagnostics for a work machine, the case bases being comprised of diagnostic information and processes related to the work machine, comprising:

an external source containing service information related to the work machine;
and,

a diagnostic advisor tool for interaction with a user, receiving information from the user and responsively displaying at least one recommended action, and providing a link to relevant information within the external source;

wherein the diagnostic advisor tool is adapted to receive, from the user, a description of an initial problem related to the work machine, display at least one question, as a function of the initial problem, and display a first set of recommended actions, as a function of the initial problem; to read data values from the work machine in response to a user request, to receive an answer from the user to the at least one question and display a second set of recommended actions as a function of the initial problem and the answer to the at least one question, wherein the second set of recommended actions is one of a subset of the first set of recommended actions, a set of other recommended actions, and a combination of recommended actions from the first set and an other set; to display a confidence level associated with each recommended action in the first and second sets of recommended actions; and to provide a link to information related to the work machine in an external source.

Claim 45. (previously amended) A computer program product for providing case base diagnostics for a work machine, the case bases being comprised of diagnostic information and processes related to the work machine, the computer program product comprising a computer usable storage medium having computer readable program code means embodied in the medium, the computer readable program code comprising:

computer readable program code means for receiving from an user, a description of an initial problem related to the work machine;

computer readable program code means for displaying two or more questions, as a function of the initial problem;

computer readable program code means for displaying a first set of recommended actions; as a function of the initial problem;

computer readable program code means for reading data values from the work machine in response to a user request;

computer readable program code means for receiving an answer from the user to the two or more questions, and identifying inconsistent answers provided to the questions; and,

computer readable program code means for displaying a second set of recommended actions as a function of the initial problem and the answer to the at least one question, wherein the second set of recommended actions is one of a subset of the first set of recommended actions, a set of other recommended actions, and a combination of recommended actions from the first set and an other set.